

B. Remarks

The claims are 1-22, with Claims 1 and 3 being in independent form. Favorable reconsideration and allowance of the subject application are respectfully requested in view of the following remarks.

Claims 1-4, 6, 7, 12-19, 21 and 22 stand rejected under 35 U.S.C. § 102(b) as allegedly being anticipated by Haraldsson et al., Journal of the American Oil Chemists Society, Vol. 74, No. 11 (1997), pages 1419-1424 (*Haraldsson I*). Applicants respectfully traverse this rejection.

The present invention is directed to a lipase catalysed esterification of marine oils. More specifically, the claimed invention relates to a process for separating ethyl or methyl ester fraction enriched in EPA (eicosapentaenoic acid, C₂₀:5) and a free fatty acid fraction enriched in DHA (docosahexaenoic acid, C₂₂:6) from a mixture of such compounds that has been obtained by direct esterification of fish oil free fatty acids with ethanol or methanol using lipase, followed by molecular distillation. The invention is also directed to a process for treating a marine oil composition containing EPA and DHA as C_n alkyl esters of fatty acids (n = 2-18) with a C_m alcohol (m = 1-12; n > m) in the presence of a lipase catalyst under essentially organic solvent-free conditions, and separating the fractions by molecular distillation to form (1): a C_n alkyl ester fatty acid fraction (n = 2-18) enriched in DHA as compared to the starting material and a C_m alkyl ester fatty acid fraction (m = 1-12; n > m) enriched in EPA as compared to the starting material, or (2): a C_n alkyl ester fatty acid fraction (n = 2-18) enriched in both DHA and EPA as compared to the starting material and a C_m alkyl ester fatty acid fraction (m = 1-12; n > m) lower in both DHA and EPA as compared to the starting material.

Haraldsson I fails to anticipate the present invention because it fails to set forth each and every claim element of the present claims. More particularly, *Haraldsson I* is directed to a process for separating EPA and DHA from other fatty acids in fish oil by transesterification using lipases as catalysts. As the Examiner noted, *Haraldsson I* “does *not* teach the direct esterification of fish oil using alcohol.” Office Action, page 4 (emphasis added). Applicants believe the Examiner meant to state that *Haraldsson I* “does not teach the direct esterification of fish oil free

fatty acids using alcohol.” In addition to not disclosing the direct esterification of fish oil free fatty acids, *Haraldsson 1* also does not disclose the separation of DHA in free fatty acid form from EPA in ester form.

Likewise, *Haraldsson 1* does not anticipate the presently claimed process of treating a marine oil composition containing EPA and DHA as C_n alkyl esters of fatty acids ($n = 2-18$) with a C_m alcohol ($m = 1-12$; $n > m$) in the presence of a lipase catalyst under essentially organic solvent-free conditions, and separating the fractions by molecular distillation to form (1): a C_n alkyl ester fatty acid fraction ($n = 2-18$) enriched in DHA as compared to the starting material and a C_m alkyl ester fatty acid fraction ($m = 1-12$; $n > m$) enriched in EPA as compared to the starting material, or (2): a C_n alkyl ester fatty acid fraction ($n = 2-18$) enriched in both DHA and EPA as compared to the starting material and a C_m alkyl ester fatty acid fraction ($m = 1-12$; $n > m$) lower in both DHA and EPA as compared to the starting material. Such a process is just not disclosed in *Haraldsson 1*.

In sum, *Haraldsson 1* fails to set forth each and every claim element of the presently pending claims. For all these reasons, Applicants respectfully request withdrawal of the §102 rejection.

Claims 1-22 stand rejected under 35 U.S.C. § 103(a), as allegedly being obvious over *Haraldsson 1*, in view of Haraldsson et al., Journal of the American Oil Chemists Society, Vol. 75, No. 11 (1998), pages 1551-1556 (*Haraldsson 2*). Applicants respectfully traverse this rejection.

As noted above, the present invention is directed to a lipase catalysed esterification of marine oils. More specifically, the claimed invention relates to a process for separating ethyl or methyl ester fraction enriched in EPA (eicosapentaenoic acid, C20:5) and a free fatty acid fraction enriched in DHA (docosahexaenoic acid, C22:6) from a mixture of such compounds that has been obtained by direct esterification of fish oil free fatty acids with ethanol or methanol using lipase, followed by molecular distillation. The invention is also directed to a process for treating a marine oil composition containing EPA and DHA as C_n alkyl esters of fatty acids ($n = 2-18$) with a C_m alcohol ($m = 1-12$; $n > m$) in the presence of a lipase catalyst under essentially organic solvent-free

conditions, and separating the fractions by molecular distillation to form (1): a C_n alkyl ester fatty acid fraction ($n = 2-18$) enriched in DHA as compared to the starting material and a C_m alkyl ester fatty acid fraction ($m = 1-12$; $n > m$) enriched in EPA as compared to the starting material, or (2): a C_n alkyl ester fatty acid fraction ($n = 2-18$) enriched in both DHA and EPA as compared to the starting material and a C_m alkyl ester fatty acid fraction ($m = 1-12$; $n > m$) lower in both DHA and EPA as compared to the starting material.

As noted above, *Haraldsson 1* is directed to a process for separating EPA and DHA from other fatty acids in fish oil by transesterification using lipases as catalysts. As the Examiner noted, *Haraldsson 1* does *not* teach the direct esterification of fish oil free fatty acids using alcohol. Office Action, page 4. In addition, *Haraldsson 1* teaches the separation of EPA and DHA as glycerides from other fatty acids in ester form. In other words, it discloses the separation of components with a substantial difference in molecular weight and volatility. However, *Haraldsson 1* does not teach or suggest that the separation of DHA in free fatty acid form from EPA in ester form is possible.

Likewise *Haraldsson 1* fails to teach or suggest the presently claimed process for treating a marine oil composition containing EPA and DHA as C_n alkyl esters of fatty acids ($n = 2-18$) with a C_m alcohol ($m = 1-12$; $n > m$) in the presence of a lipase catalyst under essentially organic solvent-free conditions, and separating the fractions by molecular distillation to form (1): a C_n alkyl ester fatty acid fraction ($n = 2-18$) enriched in DHA as compared to the starting material and a C_m alkyl ester fatty acid fraction ($m = 1-12$; $n > m$) enriched in EPA as compared to the starting material, or (2): a C_n alkyl ester fatty acid fraction ($n = 2-18$) enriched in both DHA and EPA as compared to the starting material and a C_m alkyl ester fatty acid fraction ($m = 1-12$; $n > m$) lower in both DHA and EPA as compared to the starting material. In sum, one of ordinary skill in the art would not arrive at the present invention given the disclosure of *Haraldsson 1*.

Haraldsson 2 does not remedy the deficiencies of *Haraldsson 1* either. *Haraldsson 2* describes the direct esterification of fish oil free fatty acids with ethanol to provide ethyl esters comprising the bulk of the saturated, monosaturated fatty acids from fish oil together with EPA and

most of the polyunsaturated fatty acids, except DHA. Most of DHA is present in the residual free fatty acids. However, as noted by the Examiner, *Haraldsson 2* does not teach the molecular distillation step. Office Action, page 4.

The work described in *Haraldsson 2* was a collaborative effort between scientists (including one of the inventors of the present application) who were among the world's leading experts in molecular distillation (also known as short path distillation or SPD) technology at that time and based on their extensive experience, they were of the opinion that it would be impossible to separate EPA as ethyl esters from DHA as free acids. There were no known reports describing such a separation either. Such separation is to a large extent dependent on molecular weight (also on polarity) and it was clear that EPA ethyl ester is just two atomic mass units higher in molecular weight (328 g/mol) than DHA as free acid (326 g/mol). Despite their difference in polarity, the close molecular weights of EPA ethyl ester and DHA as free acid was believed by persons of extraordinary skill in the art to make the separation of these molecules by molecular distillation very difficult.

The problem to be solved by the present invention was to provide an improved process for separating an ethyl or methyl ester fraction enriched in EPA and a free fatty acid fraction enriched in DHA. The solution to the problem is obtained by the distillation part as defined in the present claims.

A person skilled in the art, having the device known from *Haraldsson 2* as a starting point, aiming to solve the above-identified problem, even with the knowledge from *Haraldsson 1*, would *not* arrive at the invention according to the present claims. Even though *Haraldsson 1* and *Haraldsson 2* relate to the same technical field, the combination of what is known therein *would not* be obvious for a person skilled in the art. For all of these reasons, Applicants respectfully request withdrawal of the §103 rejection.

Claims 1-22 stand rejected under the judicially created doctrine of obviousness-type double patenting as allegedly being unpatentable over Claims 12-20 and 22-24 of U.S. Patent No. 6,518,049 (the '049 patent).

Applicants submit herewith a Terminal Disclaimer over the '049 patent. The fee for the recordation of the Terminal Disclaimer is paid via Deposit Account 06-1205.

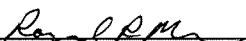
The other rejected claims in this application depend from one or another of the independent claims discussed above and, therefore, are submitted to be patentable for at least the same reasons. Because each dependent claim also is deemed to define an additional aspect of the invention, individual consideration or reconsideration, as the case may be, of the patentability of each claims on its own merits is respectfully requested.

In view of the foregoing remarks, Applicants respectfully request favorable reconsideration and allowance of the claims in the present application. Should the Examiner believe that issues remain outstanding, the Examiner is respectfully requested to contact Applicants' undersigned attorney in an effort to resolve such issues and advance the case to issue.

CONCLUSION

Applicants' undersigned attorney may be reached in our New York office by telephone at (212) 218-2100. All correspondence should continue to be directed to our below listed address.

Respectfully submitted,



Raymond R. Mandra
Attorney for Applicants
Registration No. 34,382

FITZPATRICK, CELLA, HARPER & SCINTO
30 Rockefeller Plaza
New York, New York 10112-3800
Facsimile: (212) 218-2200